

PSYCHE.

THE COCOONS OF *CIONUS SCROPHULARIAE*.

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The cocoons of *Cionus scrophulariae* furnish an illustration of striking similarity of form of insect structures to parts of a plant. Geoffroy¹, in 1762, without, of course, perceiving any cause for this similarity, writes of this species: "When their larvae, after having devoured the leaves of the *Scrophularia*, have arrived at their full size and are ready to transform, they make at the tip of the stems a sort of slightly transparent bladder in which they enclose themselves and undergo their metamorphosis. This round and quite firm bladder appears to be produced by a viscid moisture with which the larva is covered. How can the insect form this round vesicle with this sort of glue? This I have been unable to perceive. I have only found the larvae just enclosed in this vesicle; I have seen them there under the form of pupae, and finally the perfect insect has come out of them before my eyes. These vesicles are of the size of the shells which contain the seeds of the *Scrophularia* and are often mingled with them; but they are easily distinguished

by their transparency and by their round form that differs from the fruit of the *Scrophularia*, which terminates in a point." Again the same author writes, "This larva forms at the extremity of the branches, near the flower-buds a round shell resembling a bladder, where it undergoes metamorphosis and from which, at the end of several days, I have seen the perfect insect emerge." The preceding is the earliest mention I have found of the cocoons of *Cionus*. About a dozen writers have since written notes upon and descriptions of the cocoons of the genus.

Hermann Müller², in 1879, figures cocoons of *C. scrophulariae* on a sprig of *Scrophularia nodosa* and writes of them, "We find a still more delusive similarity of cocoons to other objects, and indeed in this case to objects immediately around them, that is to the ovaries of the plant on which they are found, in a common little curculionid, *Cionus scrophulariae*, which feeds in the larval state upon the leaves of *Scrophularia nodosa* and spins itself for pupation into brown oval cocoons on the blossom and fruit stems of the

¹ Geoffroy, E. L. Histoire abrégée des insectes qui se trouvent aux environs de Paris . . . 1762, v. 1, p. 277, 207.

² Müller, H. Schützende aehnlichkeit einheimischer insekten. (Kosmos, bd. 6, p. 119.)

same plant. These cocoons, placed among the ovaries of the plant, can scarcely be distinguished from them, altho the cocoons are neither pointed nor do they have the cleft which separates, even exteriorly, the capsule into two halves."

The cocoon, as has been mentioned by other writers, is usually fastened to a pedicel of one of the ovaries just beneath the ovary itself, being readily distinguishable from the ovary by its transparency and form, and the end of the cocoon farthest from the ovary is cut off like a roundish lid by the beetle in emerging.

I find no correct notice, however, of the little punctures which dot the cocoon. These holes have an appearance as if pricked from within the cocoon with a fine needle, for their margin is somewhat elevated outside, as is the edge of a needle-hole in paper. The diameter of the holes themselves is 0.05 mm. to 0.06 mm., and they are scattered about on the sides of the cocoon at quite irregular distances from each other. On the end of the cocoon toward the ovary of the plant, which is usually also the upper end of the cocoon, these punctures are very rarely to be found, but on the other end of the cocoon they are as abundant as they are upon the sides.

The function of these punctures is, probably, to admit air to the enclosed pupa, for the cocoon-material itself is very firm in texture and impervious both to water and to air. The protrusion of the margins of each puncture is apparently to prevent the entrance of water. The exterior surface of the cocoon is

not, as is often the case with such structures, repellent to water; it moistens readily, but these punctures mostly remain open while it is moist. They furnish thus an inlet for air, an outlet for the moisture emanating from the pupa during its metamorphosis, and still they prevent the entrance of water in rainy weather; their rarity or absence from the upper end of the cocoon being apparently further protection from the force of raindrops. Quite possibly, too, the protruded margins of the punctures prevent the entrance of spores of fungi which would be injurious to the pupa.

Westwood³ describes the cocoon of *C. scrophulariae* as "formed with open meshes, like that of the *Hypera*." This statement by Westwood, probably made upon the authority of Schäffer⁴ is criticized by Osborne,⁵ who writes, "These cocoons are prolate spheroids, lemon-shaped, but not pointed at the ends, and are sparsely covered in the middle region with raised whitish 'goose-skin' points, which appear to be produced by the subsequent filling up of small openings left in the original making of the cocoon. A cocoon seen in the unfinished state would present cribriform openings, but would not even then be like the network cocoon of *Hypera*." Osborne writes further: "The pupae at first are extremely delicate, almost like transparent glass:

³ Westwood, J. O. An introduction to the modern classification of insects . . . 1839, v. 1, p. 343.

⁴ Schäffer, J. C. Abhandlungen von Insekten, . . . 1779, v. 3, pl. 9.

⁵ Osborne, J. A. On the cocoons formed by *Hypera rumicis* and its parasites and *Cionus scrophulariae*. (Entom. mo. mag., 1879, v. 16, p. 16-18.)

become greenish or whitish and opaque after some time; and, if exposed to too dry an atmosphere, both pupation and the exclusion of the imago are rendered impossible or difficult. Therefore, I imagine a close, membranaceous cocoon is a necessity."

I have found, in examining a large number of specimens of cocoons of *C. scrophulariæ*, no exception to the existence of punctures in them, altho the punctures are never large enough to be termed open meshes. Were it not for these punctures the cocoons of *C. scrophulariæ* would be, to all appearances, hermetically sealed. This is not the case with the cocoons of *bombyciæ*, as can be seen readily, by covering a portion of a cocoon with soapy water

and blowing through the portion to be tested. The numerous bubbles which form on the outside in such an experiment are clear proof of the passage of air through the cocoon-walls. Even the very compact inner lining of the cocoon of *Attacus promethea* readily allows the passage of air.

Treated with dilute acids the cocoon of *C. scrophulariæ* shows little change; alkalis dissolve out of it, as they do out of cocoons of *bombyciæ* and even out of portions of insects themselves, a brownish-yellow coloring matter, which loses its color on being acidulated, and regains it upon again making the solution alkaline. The whole cocoon of *C. scrophulariæ* is soluble in strong nitric acid.

NOTES ON PTEROPHORIDÆ OF NORTH AMERICA. 2.

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In the list of references concerning *pterophoridae* which I published in *PSYCHE*, Sept.-Oct. 1883, v. 3, p. 402-404, I omitted, by some accident, all references to a paper published by Dr. D. S. Kellcott in the Bulletin of the Buffalo society of natural sciences for January 1882, and afterwards as a separate. Wishing to make my notes as complete as possible I add the following data taken from that paper, the title of which is "Notes on the larvae of some local *pterophoridae*."

Platyptilus carduidactylus Riley. Kellcott (Bull. Buffalo soc. nat. sci., Jan. 1882, v. 4, p. 47) gives notes on the larva and pupa of this species, and states that it is often

parasited by a variety of *Ichneumon humilis*. Provancher.

Oedematophorus cretiodactylus Fitch (1st and 2nd Repts. nox. ins. N. Y., 1856, p. 142). Kellcott (Bull. Buffalo soc. nat. sci., Jan. 1882, v. 4, p. 48-50) describes the larva and pupa of this species. The gregarious larvae feed upon *Eupatorium purpureum*, the leaves of which they fasten together with a web. N. Y., Cal., Vancouver's Isl.

Lioptilus homodactylus Walk. Kellcott (Bull. Buffalo soc. nat. sci., Jan. 1882, v. 4, p. 48-50) describes larva and pupa of this species. The gregarious larvae feed among leaves of *Eupatorium purpureum* which they have webbed together. Buffalo, N. Y.

Aciptilus montanus. Wlsm. Kellcott (Bull. Buffalo soc. nat. sci., Jan. 1882, v. 4, p. 51-52) describes larva and pupa; the former feeds upon the leaves of different species of *Solidago*. Buffalo, N. Y.